



GEOHERMAL HEAT PUMP CASE STUDY:

Leon County Sustainable Demonstration Center

The Path to Net-Zero Assisted
by Geothermal



Name: Leon County Sustainable
Demonstration Center

Location: Tallahassee, Florida

Site Type: Office building

Size:

- 60 vertical boreholes, each 90 feet deep
- 8 heat pumps
- 13,000-square-foot building

Unique Features:

- 3 individual loop zones for resiliency

Energy Savings: 40% energy savings over
traditional HVAC

Cost Savings:

- System requires about 1/10 of the
maintenance costs as traditional HVAC
- Borefield maintenance is virtually zero

Funding Sources: U.S. Department of
Energy through the American Recovery and
Reinvestment Act of 2009

The University of Florida Institute of Food and Agricultural Sciences Leon County Extension building in Tallahassee, Florida, installed a geothermal heat pump to help meet their net-zero energy goals.

Photo from Leon County Government

Net-Zero Education

Through the partnership of Leon County Government in Florida and the University of Florida Institute of Food and Agricultural Sciences (UF/IFAS), the Leon County Extension program has a long history of improving lives in the community. Through demonstration sites and interactive exhibits, this program provides the community with access to critical knowledge in agriculture, natural resources, and life sciences.

In 2007, the Leon County Board of County Commissioners formalized a priority of reducing greenhouse gas emissions throughout the county. Leon County Government identified the UF/IFAS Leon County Extension office as an optimal demonstration building to educate the community about multiple sustainable energy systems.

Completed in Just Six Weeks

A team from Leon County Government and consultants began to identify sustainable energy projects to



Teaching Future Generations About Net-Zero Energy.

Student visitors learn how the stable ground temperature can offset energy costs through geothermal. *Photo from Leon County Government*

minimize peak energy demand and lower utility costs in the building, including a solar photovoltaic (PV) system, lighting retrofit, thermostat setbacks, and a geothermal heat pump (GHP) system. Funding for the project came from the Leon County Government as well as grants, such as \$178,000 in state-allocated federal funding from the American Recovery and Reinvestment Act of 2009.

The geothermal heat pump system took six weeks to complete and was finished in 2012. The system includes a closed-loop geothermal borefield with 60 vertical wells around 90 feet deep with three individual loop zones for resiliency. If one loop needs repairs, the other two will continue to operate. The borefield is also used as parking overflow.

Eight geothermal heat pumps replaced nine traditional air conditioning condensers and allow the system to remove or recover heat, depending on the season. Most of the geothermal heat pump system's heaviest work happens during the hot and humid northern Florida summer months. Recovered waste heat from the system also supplies the site's kitchen with hot water.

Impacted by History

The geothermal heat pump system only supplies about 50% of the 13,000 square foot building's conditioned air.

The reason for this can be explained by the building's not-too-distant past.

As with any retrofit, mysteries and vital historical elements surface. When the team began to plan and design air distribution for their geothermal heat pump system they reviewing the original plans from 1962 and found that the building was originally constructed as a racially segregated building, even featuring segregated air conditioning infrastructure.

The existence of two mechanical rooms is unusual, as is the segmented air supply system. The separate HVAC systems influenced the decision to allocate the geothermal heat pump system to about 50% of the building; a traditional natural gas HVAC system serves the other half. The on-site solar PV system offsets the remaining electricity consumption to maintain net-zero energy goals.

Less Energy and Maintenance

Fast forward to the present day and the geothermal heat pump system continues to reduce energy and maintenance costs. The system has 40% energy savings compared to a traditional HVAC system and requires about 1/10 of the maintenance costs. In addition, the geothermal borefield has virtually zero maintenance except for an annual fluid test. In fact, the County's training of new maintenance staff focuses primarily on conventional HVAC because upkeep on the geothermal heat pump borefield is negligible.



The building continues to operate as a net-zero facility even as we've doubled the number of staff people that occupy the site. The geothermal system has been a key part of infrastructure allowing the building to stand up to evolving demands.

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